Charles Batchelor Notebook, Cat. 1305

This notebook contains dated entries for the years 1885-1886, 1891, 1897-1898, and 1909. There are also a few undated entries, probably from the period 1879-1885. All of the entries are by Charles Batchelor. The notes, drawings, and calculations relate primarily to experiments on lamps and dynamos recorded between 1884 and 1886. Some of the material from 1891-1898 pertains to ore milling experiments. The undated entries include notes on the Edison-Sims torpedo motor and on patent interferences involving the telephone. There is also a copy of a telegram from Batchelor to Edison concerning the formation of the Edison United Manufacturing Company. The front inside leaf is marked "Mechanical motions Mch 10 1879." The book contains 52 pages, numbered by an archivist. Many pages have been cut out of the book.

BURTON'S
Inc.
FOURTH AVENUE, N.Y.
Maiden Lane
Nassau St.

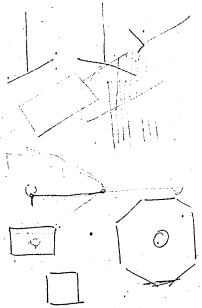
Cat 1305

Mechanical motions

Oct 10 1879

E5795.5

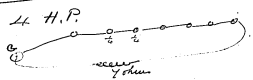
In wire wound the armature are to — wound — together in — turns of each of — pairs — the resistance of each coil is — ohms making when taken off at brushes — ohms



Shroyer says: Edison has yet to learn that increased resistance requires increased power.

Edison has a lamp of 100 ohms and gets 90 volts

Shroyer 4 H.P.



What per cent of energy do we get

The Circuit takes 3200 ft lbs

20 H.P. — 33000 × 20 = 660000

4 Machines Loss in Journal friction 10 p.c. 99 000
Loss in Engine 15 p.c. 66 000
Loss in Boilers 16 000

Telephone:—

Berliner patent 1878 Jan 15
filed Oct 16 1877

1 Claim:—
Carbon plate and points used
as a receiver

Irwin patent July 23 1878
page 345. Fil. June 12 1878.
Carbon points as a receiver
when adjusted right

Bell page 464
Transmitter of frictional
surfaces. etc

Make transmitter of Carbon
with hole in and platinum
wires through.

Make transmitter of line wire laying over a bridge.

Cook 628.
Carbon as a receiver

See 442 Telephone Exch.
Automatic

496 Automatic [illegible]
Westinghouse
also 848

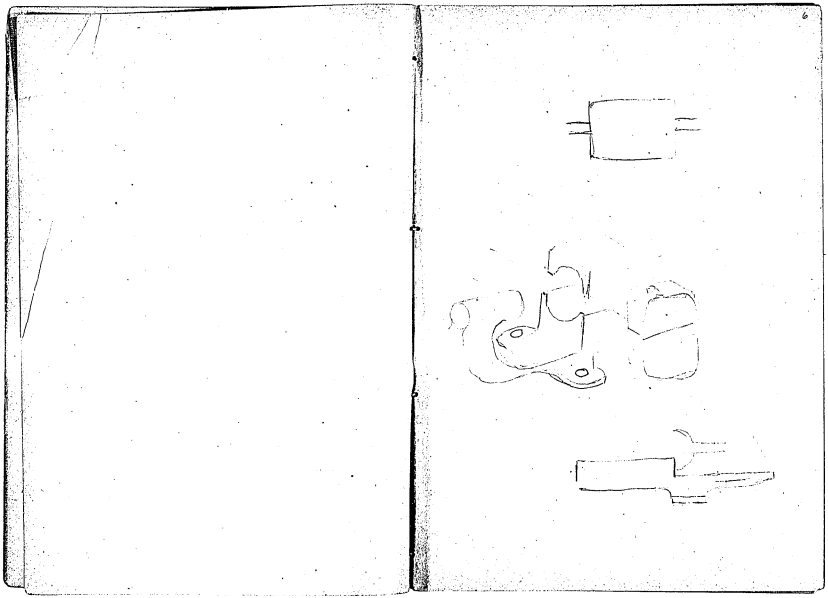
The Waton machine for 200 Amps
70 Volts
1000 Rev.
Revs Armature .0011
" Magnet 24 ohms.

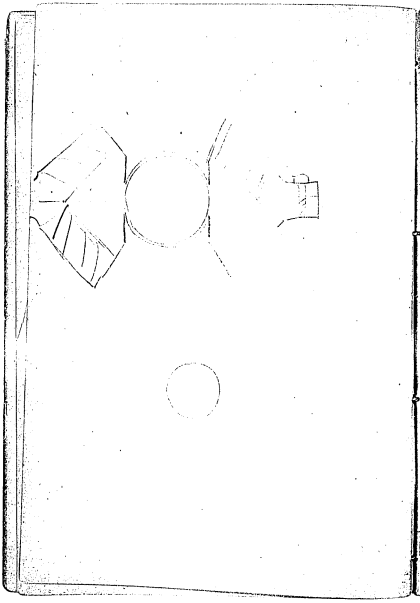
Take no 200 amp Machine

5

Sims Torpedo motor -
1151 Dynamos per minute

$\frac{3814}{636}$ ÷



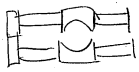


168
168
42
378
144
512
1512
1632

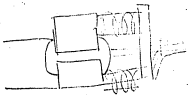
3.14
6
18.84

378
1890

~~378~~ / 18.844

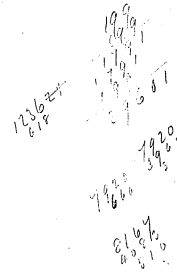


98
9
107



$\phi x = \frac{300 \times 2 \times 2 \times 50}{50.00} = 30$

$V = \frac{1600 \times 160}{60} = 4267.30 = 4.27$



120 Ampere

21.195

$6.75 \times 3.14 = 21.195$

$48 \quad 1.25 \quad 60$

$20.5 \quad 10.25 \quad 000$

$13.14 \quad 3.14 \quad 18.990 \quad 50$

$3.14 \quad 6.25$

$3942 \quad 314 \quad 11$

$4126.5 \quad 314 \quad 2015$

$20635 \quad 6.9.8.2.7.0$

$16504 \quad 7.0.8.0.7.0$

82552

$101.0.5.7.0$

$R = \frac{l \times 10.34}{8} =$

$l = \frac{24.15}{18.14} \times 2 \times 54$

57.64

75.28

54

3012

3764

4065

4339

339

10.314

1356

1017

339

3505

123627 | 350500 | 2472540 | 1032440 | 194344

0·0283 | 0·0071 | 166 | 426 | 426 | 0·00486

400400 | 160000

0·04680 | 26850 | 0·074 | 1070 | 73100 | 4

*1

Nov. 23 1885

High volts on Siemens' Armature

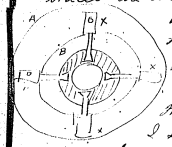
I have noticed that when we have a cross on the municipal armature it is always at the place that is either between first & last coil in top Layer or between first & last coils in bottom Layer, At these points the difference of potential is 1000 volts. The Siemens armature has the disadvantage that some of the coils lying next each other have full volts of brushes between them. It is not so with the Gramme ring, on which the full volts is only found at brushes, & between the coils there is only the E.M.F. due to the number of divisions of commutator — It might be therefore well to make an armature such as in drawing

This was patented some time ago by Edison & Cabella of Italy has taken it up & made some machine

idea. There is one thing however that is bad, & that is that the whole thing is clamped up on shaft like a commutator & so if it generates much current the leverage is so great that I should think the mica insulation would not hold, but it would allow the whole thing to turn on the shaft. Cabella's idea is to make the piece & insulate from each other & then clamp all up together on shaft; After this he insulates the inside of the body & winds it full of wire & attaches the wire piece of copper in the same way manner. (I dont see how he does it without taking up room)

If this were a good practical thing the Ohm between any two coils would be regulated by the number of commutator bars

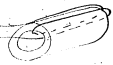
Crompton has made a similar machine called the Crompton-Kapp. Dynamo where discs are used instead of wire for the iron of armature. Iron supports



Braces are dovetailed ~~into a~~ sideways into a collar on shaft and these are fastened to pieces at X which are placed at intervals in the armature. The plates I suppose are secured by bolts through the pieces at X— the wire at A has a certain ~~section~~ number of layers ~~& shape~~ the made wire at B has a greater ~~number section~~ ~~& a different shape~~ & allows it to be got into a smaller space. He also makes one of bars of copper running lengthways of the drum. I should like to see the details of connecting these different ends of the bars & their connection to the commutator as in these things depend the success of any machine made like this.

Siemens made some years ago a machine similar to this only in the shape of a flat ring. It is described in the Electrotechnische Zeitschrift.

Makes this wound he armature 20. as to have ~~only~~ a minimum the fewest volts between each coil in armature —

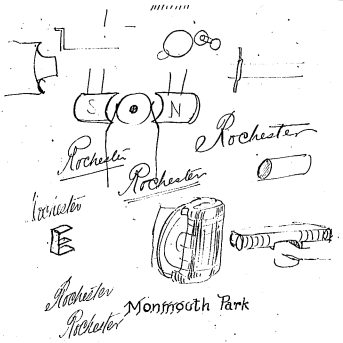


It seem to me the method for making a drum armature so that the coils should not have many volts between each other lacks the essential of strength & solidity & do the work however for Municipal lighting I think we ought to endeavour to wind it as a drum ring instead of a Siemens winding —

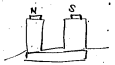
Dec 2 1885

Yel. Dyn for Cincinnati.

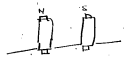
1 Circ 15 Inst. 6 Coils = 35.-



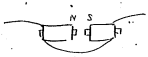
Experiment –



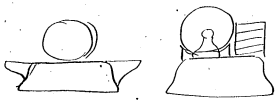
Strength of magnet

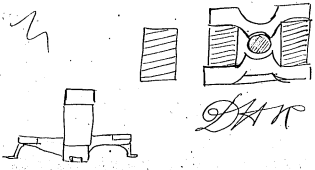


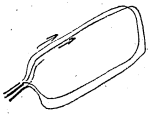
Strength now?

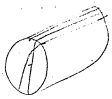


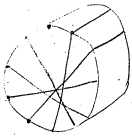
Strength now?



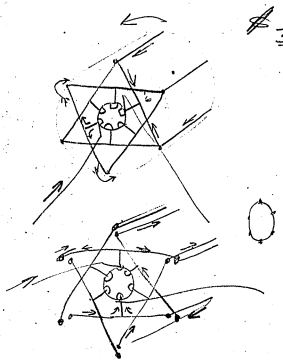


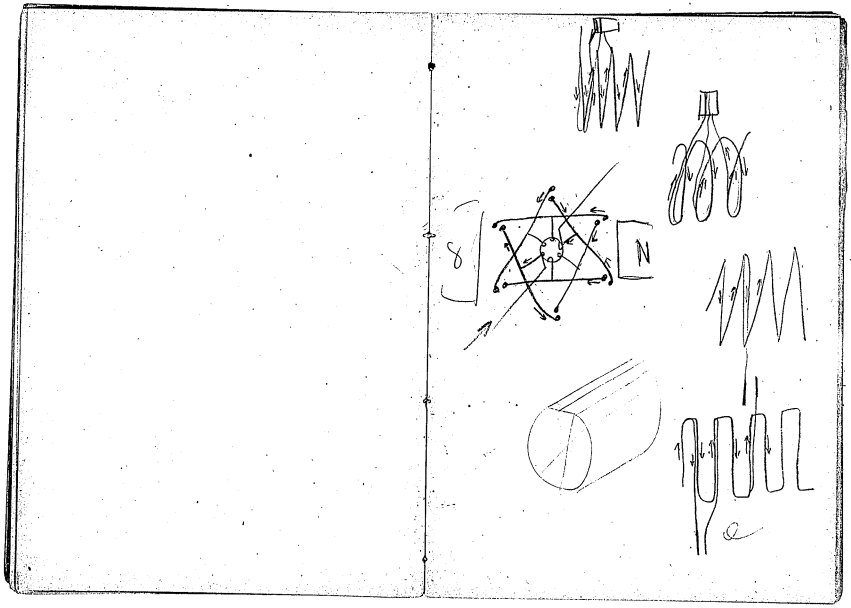






#3200

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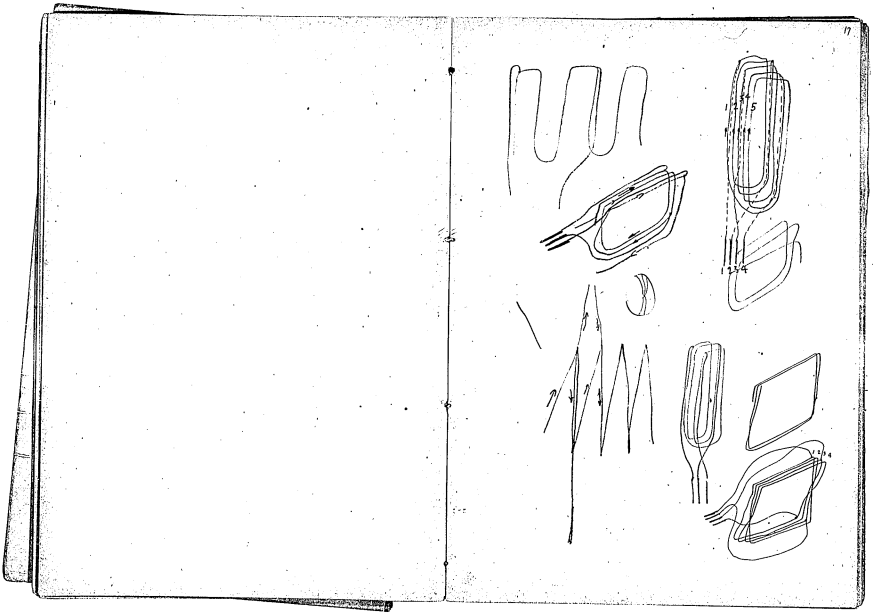
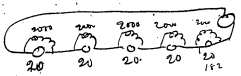




182 ohms each in
910 ohms in all

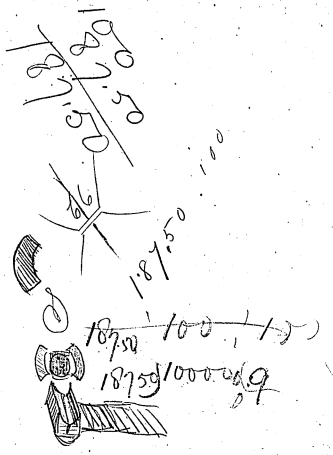
$\frac{100}{910}$ 100|0·11 amps.
910
900
700
.20 Volt drop in each

Of one lamp goes out resistance =

182 + 182 + 2000 + 182 + 182 =

2724|20000|0·73% or ¾ V on terminals of one instead of 20
19068
9320

Whereas the energy passing through the 2000 Ohms in one case would be ~~2020 Ohms~~
$\frac{20}{2020}$ ths + in the other



84/ Car 4267 8966.76 made. bri 361 13.80

29.75
20.83
8.72
1.00
1018 | 2350 / 2020 | 1.2

60 320 0 0 0

Dec 24th 1895

500 Ampere Dynamo

125 Volts 700 to 800 speed.

800 cuc mils to ampere =

800 × 500 = 400000 =

4 #5's = total of 387,200 cuc mils.

or 776 per amp.

4 #5 = .22 × 4 + .030 × 4 + .042 =

.88 + .12 + .042 = 1.042 × 52 =

54.184 = 17.25 " diameter through centre of first layer of wire

1.114

.220
.030
.010
.042
.520

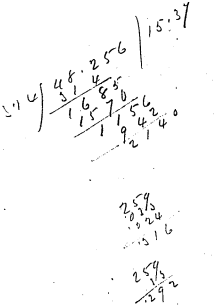
17.25 − .520 = 16.73 as bevil

No 9 000.

Try 3 # 3'

Circular mils = 402.486

805 per amp.



Diameter

3 wires	= .259 =	.777
3 inoculation	.035	.099
1 division	.052	.052
52 blocks		.928
		52
		1856
		4640
Circum. through center front laps.		48.256

48.256 = 15.37

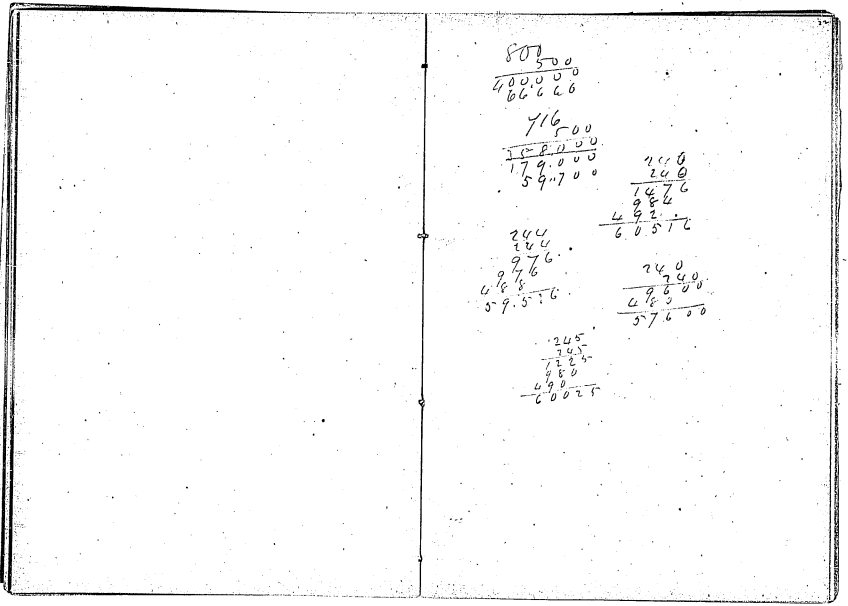
.010 .292 3.14

15.37 − .316 = 15.054″

.316 = 5/16

15.054 add 1/8″ & 1/16 .125 .062

Inn. Actual diameter 15.241



Diameter of armature =

$$
\begin{array}{r}
.245 \\
25 \\
\hline
.270 \times 3 + 050 \\
3 \\
\hline
.810 \\
.050 \\
\hline
.860 \\
10 \\
\hline
.870 \\
.66 \\
\hline
.5220 \\
5220 \\
\hline
3.14 \overline{)\,5\,7.4\,2\,0} \;\Big|\; 18 \\
\;\;3\,1\,4 \\
\hline
\;\;2\,6\,0\,12
\end{array}
$$

25000 / 13000000 / 0.52%
125000
50000

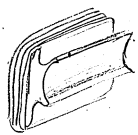
x = 54 / 100 = 50.0

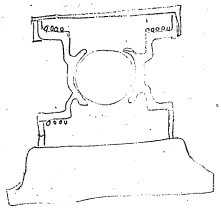
54 / 100 / 0.52
400
280
120
104
16

250.000,00 250 Sh. 100%

@ B.	4000
9 K.	4000
2 Yay.	4000
S.D	300
Trahen	300
	13.000

@ B.	4000
9 K.	4000
1½ Yay.	3300
2 Yay.	700
S.D.	500
Trahen	500
	13.000





Mch 24 1886

W K Freeman Brooklyn

302 554 1884 filed
Nov. 1885

Displaced Core

Apl	15.	Bell Tel		96 ✓
July	15	"		96
Oct	15			96
Jan	15			96 ✓
Dec	1	B T Co	600	
Mch	1	" "	600 ✓	Tel every month
June	1		600	100 "
Sept	1		600	Can
Apl	1	Sample Co	250 ✓	
July	1	"	250	
Oct	1		250	
Jan	1		250 ✓	
Feb	1	Mfg Co	55 ✓	
May	1	" "	55	
Aug			55	
Nov	1		55	
Jan	1	4	130 ✓	
Apl	1	"	130	
July	1		130	
Oct			130	
Mch		4th	202 ✓	
June			202	
Sept			202	
Dec			202	

June 29 1881.

38000
5000
6256
750
2500
2800
1000
4400

22,006

4.5 200000 4444
1800
200
150
200

4444

134,000
536,000

Cam 400

Jan	100 + 96 + 250 + 130	=	566	
Feb	100 + 35 Mfg Co	=	135	
Mch	100 + 200 Bayonne 202	=	902	
Apl	100 + 96 + 250 + 130	=	566	
May	100 +		135	
June	100		902	
July			566	
Aug			135	
Sept			902	
Oct			566	
Nov			135	
Dec			902	
			6,412	

1850
1400
250

556010

3820 at 10% Layton & Co 6412
E.M.W. – 134000 at 4% 5320
E.M.W. Salary 5000
E.M.W 100000 at 7% 700
17804

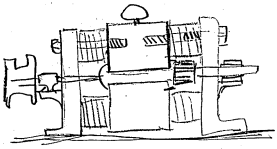
Edison Fort Myers.

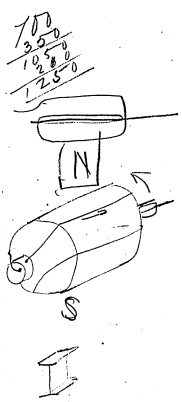
Would you favor plan of shops taking Isolated business except Lamp renewals and Isolated giving out of existence shops form a selling department which pays 2% of net shop price of everything to Light Co & Half profit of selling department – price to selling department being present shops prices – ~~Selling loss~~ If basis made by selling department each shops to pay one third – selling department loss to be made up before division of profit with Light Co

Batchelor

78 Words.

Jan. Tel.
Lamp Co

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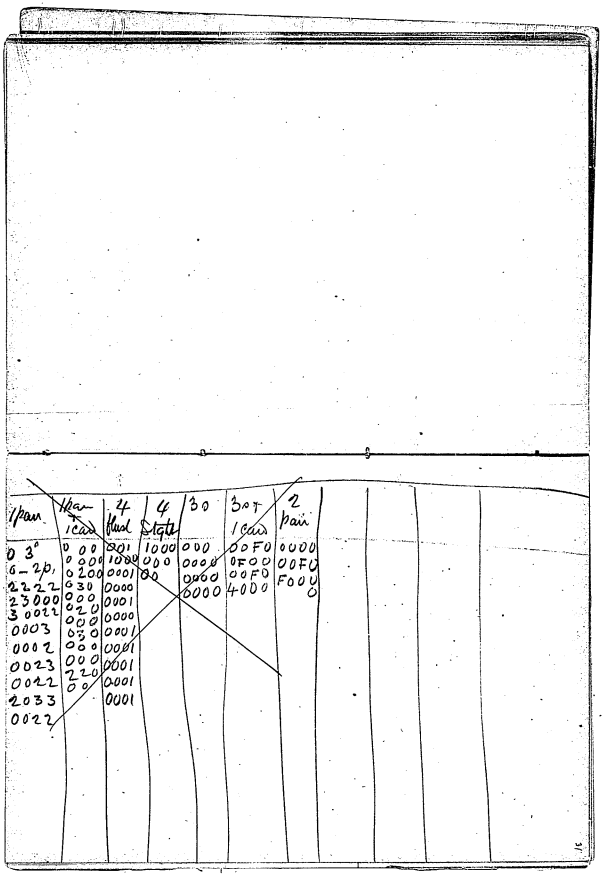
1 pair
Han
1 card
4
Hand
4
Eight
30
30 of
1 card
2
pair
0 3°
6 – 2p,
2222
23000
3 0022
0003
0002
0023
0022
2033
0022
0 00
0 000
0 200
0 30
000
000
0 20
000
000
000
220
0 0
0001
1000
0001
0000
0001
0000
0001
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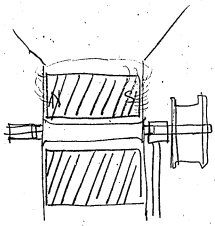
4000
0000
00FU
F000
0



Mg per Bj.

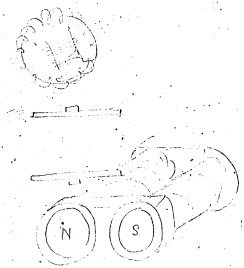
$31.68 / 299.95 | 9.46$

$\begin{array}{r} 28512 \\ \hline 14638 \\ 14672 \\ \hline 19580 \end{array}$

$\begin{array}{r} 450 \times .066 = 13. \\ \hline .066 \\ 2700 \\ 2700 \\ \hline 29.700 \end{array}$

$\begin{array}{r} 20.67 \\ 9.46 \\ \hline 12402 \\ 82680 \\ 186030 \\ \hline 195.5982 \end{array}$

$\begin{array}{r} 14411 \\ .0205 \\ \hline 72055 \\ 28822 \\ \hline 295.4255 \end{array}$



Diadem of a metal in battery
Passing a wire in front of a magnet
Heating two dissimilar metals at their junction

1 grain = ~~15.4324 Grams~~
0.06375 Milligrams

Urein 10 Pyrogallic Acid .637 mg
75 Carb Soda 4.7965 4.7781 mg
100 Sulph Soda 7.687.000 mg

5 | 450
90
32
12.2

5000 / .008240 | 0.00165
5000
32400
30000
2400

5000 / 0.15160 | 0.0301
15000
160
15

Oct 24th 1891

#6 + #7. To determine relative amt of Sulphur. —

each 1 gramme.
20 cc Nitro Muriatic Acid

480/15434

480/305944 | 063.7 | 06375
2880 | 318.75
1794 | 4462.5
1440 | 4781.25
3540

.0530
0.13
.166

.0530
.1332
.06662

0.0662
75
3310
4634
4.96.50

.0530
.0662
110
72820

660

.06370
70070

#6 1 gramme Washed

·011 of Sulphate Baryta.

·011 × 0·13734 = Sulph per gramme

·13734
·011
13734
13734
·0015107 Sulph in one gramme
733920

1000 / ·0015107 / 0.0000015
1000
5107
5000

1½ mg in each gramme

·13734
·06
·0082404

1000
150
1000

·13734
·90
123606
96138
·1084926

·13734
1·105
54936
13734
13734
5·000 / 0·10850 / 0.0000217
10000
8500
5000
3500
3500

·13734
·0015107
5·000
·0000·217
·0001085000

Troy grains 0·8 = ·05184 gr. ∴ 1 gr. = ·066 roughly

Therefore 1 lb. = 12 × 20 × 24 × 0·066 grammes
= 366,960 / 733920

1 Lm = mg. 2000 lb apoth

#6 Grains 150/1000 of 1% Sulphur.

10% 5·0000 / 0·108500 / 0·0217
1% ·500 / 100000 / 1000
·050 / 8500
5000
3500
3500

5·0000 1085 ·68%
5000 / 10850 / 0·021 / 100 / ·068 / 1000

·108 ·0217
0·021 / 100 / 2·1700
1050 / 5000 / 10850 / 0·0217 / 10000
5000 = 1085 / 1000 / 21½ / 100 / 50000

May 5th 1891

Canada Mine

#32 from 19c. Line

1 20 grammes material ground 50 mesh

20 " #2 } Concentrate
#3 } Tailings

Amount of sulphur in all the last two ought to equal the 1st

May 10 Put 5 grammes of each in 100 c.c. Erlenmeyers @ C of

1 Nitro Muriatic acid 6hrs

2 afterwards at 50 c for about 1/2 hr

3 evaporated to dryness.

#1 - 0.790 Sulp Bangle

2 - 0.060 " "

3 1.105 " "

X 0.13734 = S

			%
#1 =	.790 X 0.13734 =	.1085	S = 2.17
#2 =	.060 X 0.13734 =	.00824	S = 0.165
#3 =	1.105 X 0.13734	.1516	S = 3.030 / 1.0000

In this #2 & #3 there may be other matter as I did not acidify before ppt'g last time & so I dissolved out by HCl afterwards. I have kept them & will purify

May. 6 1891

Kodak. #2

1 Cupboards & Mirr. on table Cloudy outside 1/25 sec

2 " " " "

3 } Magnet table & Bookcase. Bright
4 } " " " 1/25 sec

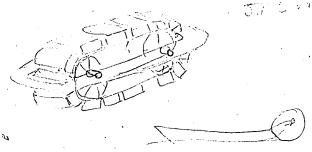
5 View from head of Bookcase ect
Bright Sun Snap shot

6 View from cupboard shelf
Bright Sun 1/25 sec.

7 Snap shot from my bedroom window
Bright Sun

H is $\frac{1}{11162}$ of water — i. $\frac{1}{10000}$ of the body of
per vol. about

Hutton's dict: Article Aerostation
previous to 1835
much information



Test #25 May 26d 1891

Blue quartz sprinkled with Pyrites

Micros. - nothing but pyrites Iron -

Took. 30.9g of chrid 80 mesh. + washed.

Assay. 26 May 24 1897

Quartz rock with black ore in (looks like iron) & small specks of free gold – Some of the black material has a bronzed cast also. a material looks like galena

1 troy grain = .066 grammes

1 gm / 1 ton 2000 lbs × 12 × 20 × 24 × .066 = multip. 760 320.000

760 320 gr. ÷ 52.760 gr. = about 14411

∴ .0208 gr × 14411 = Weight of gold per ton = 299.750 grammes

Value at $20.67 per Tr. oz. =

1 Tr. Troy = 31.66 grams = 299.75 ÷ 31.68 = 9.46 Tr. oz. per ton

9.46 × $20.67 = $195.57 per ton

Crushed 52.760 gr. & 80 mesh – at the last the free gold was left on the little bit that would not go through

52.760

Free gold .026 × .8 = .0208

about

of the remainder & dissolved in Nitro Hy. Look. 5 grams & dissolved in Nitro Hy. + pt to wit Sulp. Hydrogen

Residue #1 from Hy Nos. – Pp. 1 black Filt. #1

Filt. 1 may contain Groups I-IV. – Acid reaction

mixed to expel HO

HNO_3 added – color slight yellow

NH_4OH " Brown pp.

$(NH_4)_2S$ " 2 distinct pp. 1 white or grey & 1 Black.

For Groups III & IV 3 dram Case for 1 & 2.

Filt & added NH_4Cl NH_4OH. Bronzed pp.

then " $(NN4)_2S$. Some black pp. #2.

Pp. #2 dissolved completely in HCl. heated to expell H_2S. & added HNO_3

Iron

Pp. 4 Contains then any of these
Pb. Bi. Cd. Cu. Hg. Au Pt. Sb,
Sb. As.
Pp is dead black so very likely
Pb. Bi, Cu, Hg. Au, Pt. + Sb.
Take small dose add little water + 20 drops
of $(NH_4)_2S$ + warm. does not dissolve —
Dilute with H_2O filter + add HCl
in excess pp. pure white turbidity
which may in absence of Au. Pt Sb
+As
Now the pp. (black may be)
Pb. Bi. Cu. Cd. Hg.

Lead & Cu for silver

Boil w/ HNO_3 - dilute - filter - ppt with HCl

Boiling filtrate - dilute - excess of HCl.
add H_2S. Black ppt. { Lead Hg.
Cu. Bi Cd.
As Pt Tin Ant
As

Add NH_4S., + filter

add HCl + excess + milky yellow

filter off. ppt Orange yellow showing
Cu or Sb.

Ppt Some of the black material + treat. Hot HNO_3 - all dissolved except a little Sulphur. Sn Silver, Lead or Hg.
Test H_2S. No ppt. No Pb. Bi, Cd, Cu, Hg, As
Pt, Sb. Cr, or As.

#26 Solution in Capt Board
Sol. treated with H_2S. + want treating by
Table IX for Co. Ni, Fe, Cr. Al.

#17 In Silver

Boiling N + M. Acids filtered —

H_2S + Bleach pp. afterwards yellow — Very small

S. Am added + filtered + HCl added Precipn.

filter wgd pp 4

~~Took~~ ~~4~~ 4 ore.

Took 10.000 gr. of Crushed ore & treat with N.M.ac. —

#23 Dolphin May 31st 1791

#24 Sulphur May 31 1891

1 = 5 grammes in 100 cc Nitromuriatic Acid 5 hrs

2 = Heated to 50° for 12 hours

3 = Evaporated

20/. 91

On Sept 8. the SS City of New York succeeded in Carrying Mails in Quarantine from Japan inside of Twenty days

Japan Aug 29.

Company Service
Yokohama & Vancouver
4750 Naut. Dist. 19. 24 m.

Can Pac & N.Y.K.
2850 stat

C.P.N.Y.
2800 naut

or Abt 10000 miles in 20 days or with a liberal average of 500 in Sterdays

5000	Brussels Sept 27.	8629
3000		420
600	Oct 1st Paris	9049
		320
		9729

#28. Sample from D. Jaycocks farm Putnam Co. N.Y. — It is from brow of hill where the Slate crops up — This sample is from between the Granite and the Slate trap

Under Micro - Greenish, crystalline, laminated, material next to the slate trap

Dark green mass of slag - streaked in places green & black

Shiny black bright metallic mass looks like Magnetic Ore

29. Sample from farm of Δ Jaycocks
Putnam Co — + picked up near
where 28 was found —

Cream. Hard, heavy, granular rock
blackish like iron ore — peculiar
rich red where weathered out
nearly color of cinnabar

Micro — Considerable iron

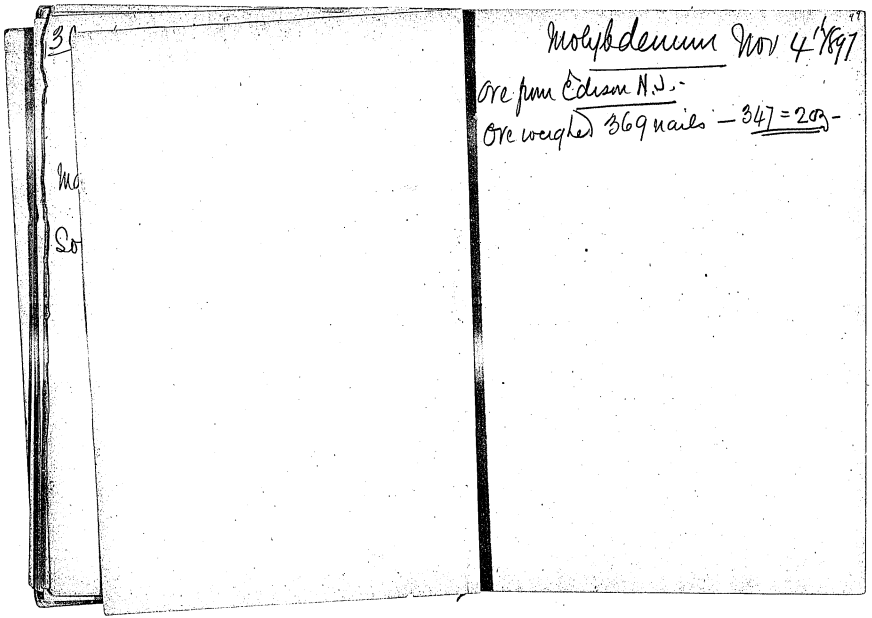
30. Sample from RR property Pa Co
This woodcreek showed me for a lime
pit stock – looks like a silver bearing
ore.

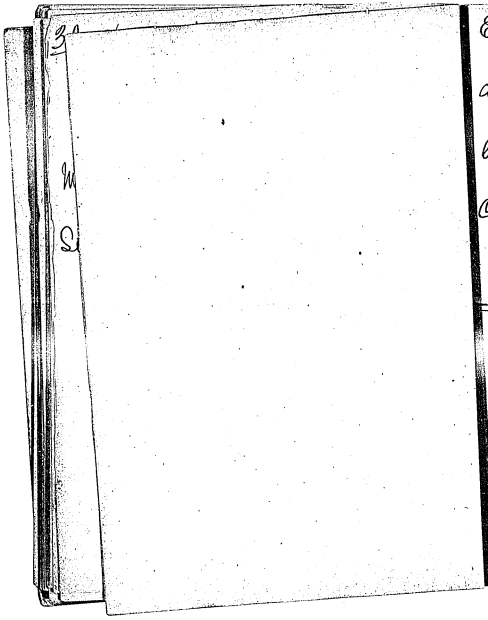
Made Sol HNO3 some ~~Aq~~ ~~Aq~~ -
either Ni Co, Fe, Mn, Zn, Cr, Al2,
Solution of N M acid

Oct 7 1897

Exp #1 – Mowed mg Cores without vent
Baking preliminary – the object being to
keep it at 100° 1 hr + increase 50° + keep one
time hour on each until 500° temp

2.06	70	Average	1	4.21	390		17
2 21	126		2	4 36	398		18
12 36	176		3	4.51	418		19
12 51	184		4	5 06	422		20.
1 06	188		5	5 21	422		21
1 21	190		6	5 36	494		22
1 36	180		7	5 51	500		23
1 51	220		8	6.06	500		24
2 06	240		9	6 21	500		25
2 21	240		10	6 36	500		26
2 36	240		11				
2 51	240		12				
3 06	272		13				
3 21	314		14				
3 36	324		15				
3 51	330		16				
4 06	360						


Molybdenum Nov 4th 1897
Ore from Edison N.J.-
Ore weighed 369 nails – 347 = 22 gms-



Expt 1 April 1898.

·1650 gram. Silver dissolved in

a. Nitric Acid + Water – slowly but on application of heat very quick

b. Heavy milky precipitate with HCl – collected + dried weighed ·2300 milligrammes

c Fused with Carb Soda, washed + separated + metallic silver 150 milligrammes

3

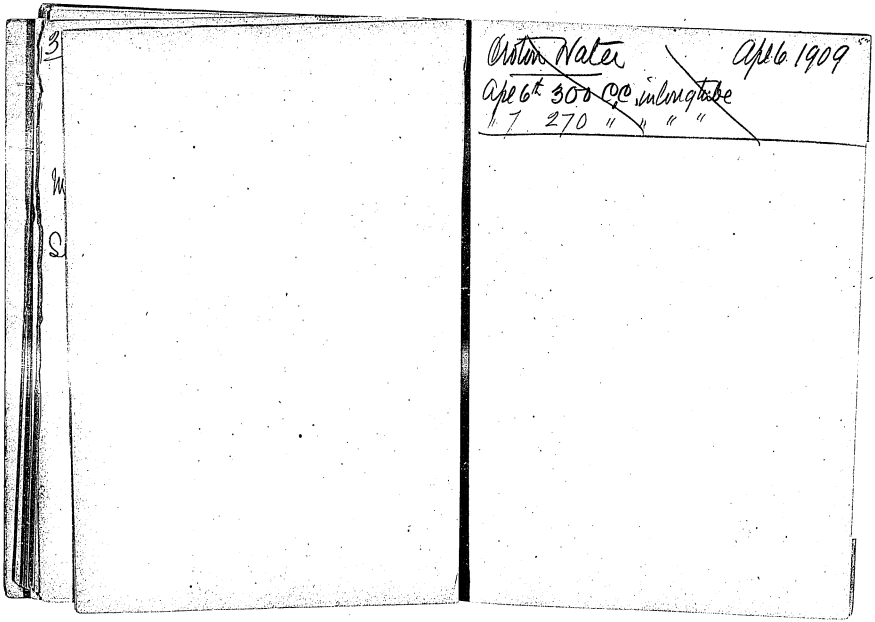
Exp 2. Apr 1895.

Q. Y. Mine Concentrate

Granulated, greyish black looking ore, heavy, having some dull & some shiny grains, Powdered some to 80 mesh. in iron mortar

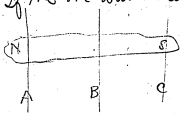
Put a little 80 mesh in glass tube sealed at one end & heated it. At a moderate heat no change. At a red heat strong Hydro Sulphuric Acid smell and yellow looking liquid about ¼" from ore and cloudy white for an inch above. Probably #1 Sulphur

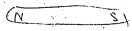
Heated with inner flame – Strong Sulphuric Acid smell and white incrustation — Powder remains about as before.

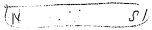

Boston Water
Apr 6 1909
Apr 6th 300 cc subcutaneously
" 7 270 " " " "

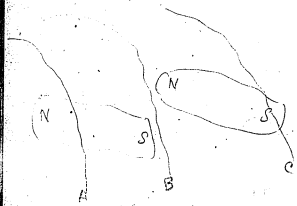
If the ore was in lenses as

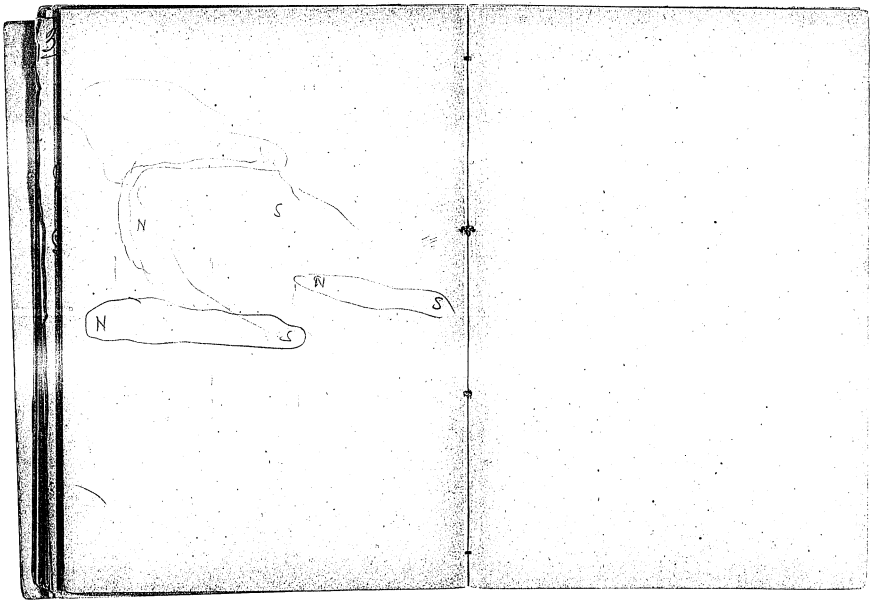
N A all +
" B all Zero
" C " −

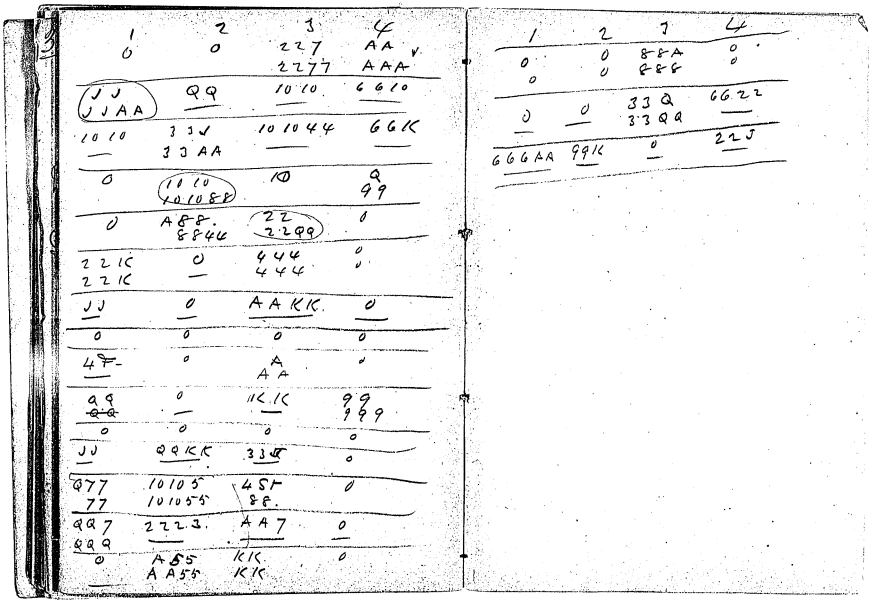


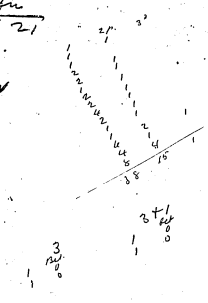







N
S
N
S
N
S



1	2	3	4
3 4 5 6	Q Q 9	K K 7 7	3 flush
6 6	9 9 9	K K 7 7	
0	0	7 7 A	0
		7 7 A	
6 6 A	8 8 Q	0	10 10 - 9 9
6 6 J J			
0	4 Fl.	2 2 8 8	K K
0			
3 3	0	0	0
3 3 3			
0	10 10 A	0	0
4 4 4	0	5 5 A	7 7
4 4 4			
10 10 K	9 9 9 10	0	4 Fl.
	9 9 9 10		
7 7 8	A A 5	0	0
	A A 5 5		
0	0	8 8 7 7	4 F
5 6 7 8	0	A	0
	0	A A	
A	K K	8	Q
A A 10 10	K K	8 8 4 4	
0	2 2 Q	K K	Q
	2 2 9 9	K K K	10 10
9 9 A	0	K K	2 2 Q
		K K 10 10	2 2 Q Q
10 10 K	K K	0	8 8 9
J J 10 3 3	K K J J		
5 5 A	0	2 2	2 2 10
0	10 10 K	0	0
0	A A	Q Q	0
	A A K K		

For
21